UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/872,397	05/31/2001	Eugene B. Hogenauer	2096P	2872

7590 11/05/2004	EXAMINER
Joseph A. Sawyer, Jr.	ALI, SYED J

ART UNIT	PAPER NUMBER
2127	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	**Applicant(s)**
Office Action Summary	09/872,397	HOGENAUER, EUGENE B.
	Examiner	**Art Unit**	
	Syed J Ali	2127	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>31 May 2001</u>.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-26</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-26</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on <u>31 May 2001</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
        application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892) 0
2) ☐ Notice of Draftsperson's Patent Drawing-Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1.   Claims 1-26 are pending in this application.

Specification

2.   The cross reference related to the application cited in the specification must be updated,
i.e. update the relevant status, with PTO serial numbers or patent numbers where appropriate, on
page 3, line 12. The entire specification should be so revised.

Drawings

3.   The drawings are objected to because the drawings are handwritten and illegible.
Additionally, the handwriting is very faint and difficult to read. Corrected drawing sheets in
compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid
abandonment of the application. Any amended replacement drawing sheet should include all of
the figures appearing on the immediate prior version of the sheet, even if only one figure is being
amended. The figure or figure number of an amended drawing should not be labeled as
"amended." If a drawing figure is to be canceled, the appropriate figure must be removed from
the replacement sheet, and where necessary, the remaining figures must be renumbered and
appropriate changes made to the brief description of the several views of the drawings for
consistency. Additional replacement sheets may be necessary to show the renumbering of the
remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page
header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the
examiner does not accept the changes, the applicant will be notified and informed of any

required corrective action in the next Office action. The objection to the drawings will not be

held in abeyance.

Claim Objections

4.   **Claims 6, 10, 12, and 20 are objected to because of the following informalities:**

a.   In line 1 of claim 6, "-" should be deleted.

b.   In line 1 of claim 10, "-" should be deleted.

c.   There is no period at the end of claim 12.

d.   In line 1 of claim 20, "scheduled" should read "schedule".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6.   **Claims 1-3, 12, and 14-15 are rejected under 35 U.S.C. 102(e) as being anticipated**

by Wuytack et al. (USPN 6,421,809) (hereinafter Wuytack).

7.   As per claim 1, Wuytack teaches the invention as claimed, including a method for

scheduling an assembled program in an adaptable computing engine, the method comprising:

        providing a plurality of computation units as hardware resources available to perform a

particular segment of the assembled program (col. 6 line 39 - col. 7 line 12);

        representing the particular segment as a dataflow graph (col. 7 lines 26-35); and

        refining a schedule that allocates the plurality of computation units in correspondence

with the dataflow graph in an iterative manner until a feasible schedule is achieved (col. 16 line

36 - col. 17 line 8).

8.   As per claim 2, Wuytack teaches the invention as claimed, including the method of claim

1 wherein the step of refining further comprises associating a value representing cost of the

schedule, and determining if the value meets conditions of acceptability (col. 7 lines 36-51).

9.   As per claim 3, Wuytack teaches the invention as claimed, including the method of claim

2 wherein the conditions of acceptability further comprise a cost of zero (col. 16 line 36 - col. 17

line 8).

10.   As per claim 12, Wuytack teaches the invention as claimed, including a system for

scheduling an assembled program in an adaptable computing engine, the system comprising:

        a plurality of computation units for providing hardware resources available to perform a

particular segment of the assembled program (col. 6 line 39 - col. 7 line 12);

a host controller for configuring the plurality of computation units (col. 7 line 52 - col. 8

line 2); and

means for scheduling and allocating the plurality of computation units to perform the

particular segment by refining a schedule that allocates the plurality of computation units in

correspondence with a dataflow graph representative of the particular segment in an iterative

manner until a feasible schedule is achieved (col. 7 lines 26-35; col. 16 line 36 - col. 17 line 8).

11.   As per claim 14, Wuytack teaches the invention as claimed, including the system of claim

12 wherein the means for scheduling and allocating further associates a value representing cost

of the schedule, and determines if the value meets conditions of acceptability (col. 7 lines 36-51).

12.   As per claim 15, Wuytack teaches the invention as claimed, including the system of claim

14 wherein the conditions of acceptability further comprise a cost of zero (col. 16 line 36 - col.

17 line 8).

Claim Rejections - 35 USC § 103

13.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

14.   **Claims 4-10 and 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wuytack in view of Crawford, Jr. et al. (USPN 6,456,996) (hereinafter Crawford).**

15.   As per claim 4, Crawford teaches the invention as claimed, including the method of claim 2 wherein when the value does not meet conditions of acceptability, the method further comprises altering the schedule through a small incremental change in a random manner to provide an altered schedule (col. 7 lines 30-41).

16.   It would have been obvious to one of ordinary skill in the art to combine Wuytack and Crawford since Wuytack considers every possible move before deciding which is best suited for effecting the greatest overall improvement upon the schedule. This may lead to a great deal of overhead in processing the cost for each possible move, resulting in an even greater delay. Crawford improves upon this by identifying the most likely causes for delay in the schedule. Once these have been identified, nodes are selected at random and the most promising modification is used. This reduces the number of calculations required without sacrificing the possible improvement to the schedule.

17.   As per claim 5, Crawford teaches the invention as claimed, including the method of claim 4 wherein the altering in a random manner further comprises selecting a node of the dataflow graph at random and selecting an available change for the selected node at random (col. 7 lines 30-41).

18.   As per claim 6, Wuytack teaches the invention as claimed, including the method of claim

4 further comprising computing the value for the altered schedule (col. 18 lines 33-61).

19.   As per claim 7, Wuytack teaches the invention as claimed, including the method of claim

6 wherein when the altered schedule has a computed value that is higher than the value of the

schedule, the altered schedule is not used (col. 18 lines 33-61).

20.   As per claim 8, Wuytack teaches the invention as claimed, including the method of claim

6 wherein when the altered schedule has a computed value that is lower than the value of the

schedule, the method further comprises designating the altered schedule as the schedule, and

repeating the step of determining if the value meets conditions of acceptability (col. 18 lines 33-

61).

21.   As per claim 9, Wuytack teaches the invention as claimed, including the method of claim

8 wherein when the value does meet conditions of acceptability, the method further comprises

designating the schedule as the feasible schedule (col. 18 lines 33-61).

22.   As per claim 10, Wuytack teaches the invention as claimed, including the method of

claim 9 further comprising representing the particular segment as a scheduled dataflow graph

once the feasible schedule has been achieved (col. 19 lines 6-7).

23.   As per claim 16, Crawford teaches the invention as claimed, including the system of claim 14 wherein when the value does not meet conditions of acceptability, the means for scheduling and allocating further alters the schedule through a small incremental change in a random manner to provide an altered schedule (col. 7 lines 30-41).

24.   As per claim 17, Crawford teaches the invention as claimed, including the system of claim 16 wherein the means for scheduling and altering further alters in a random manner by selecting a node of the dataflow graph at random and selecting an available change for the selected node at random (col. 7 lines 30-41).

25.   As per claim 18, Wuytack teaches the invention as claimed, including the system of claim 16 wherein the means for scheduling and altering further computes the value for the altered schedule (col. 18 lines 33-61).

26.   As per claim 19, Wuytack teaches the invention as claimed, including the system of claim 18 wherein when the altered schedule has a computed value that is higher than the value of the schedule, the altered schedule is not used (col. 18 lines 33-61).

27.   As per claim 20, Wuytack teaches the invention as claimed, including the system of claim

18 wherein when the altered schedule has a computed value that is lower than the value of the

schedule, the means for scheduling and altering further designates the altered schedule as the

schedule and repeats the determination of whether the value meets conditions of acceptability

(col. 18 lines 33-61).

28.   As per claim 21, Wuytack teaches the invention as claimed, including the system of claim

20 wherein when the value does meet conditions of acceptability, the means for scheduling and

altering further designates the schedule as the feasible schedule (col. 18 lines 33-61).

29.   As per claim 22, Wuytack teaches the invention as claimed, including the system of claim

21 wherein the means for scheduling and altering further represents the particular segment as a

scheduled dataflow graph once the feasible schedule has been achieved (col. 19 lines 6-7).

30.   **Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over**

Wuytack in view of Subramanian et al. (US 2002/0024993) (hereinafter Subramanian).

31.   As per claim 11, Subramanian teaches the invention as claimed, including the method of

claim 1 wherein providing a plurality of computation units further comprises providing the

plurality of computation units as a matrix in the adaptable computing machine (paragraph 0050).

32.   It would have been obvious to one of ordinary skill in the art to combine Wuytack and

Subramanian since the representing of computation units in a matrix allows for simple

calculations. Standard algorithms for calculating values based on matrix algebra are well known

and are easily adaptable to interchanging components. A matrix representation provides a great

improvement to the calculating capabilities of the system as well as allowing easy

reconfiguration.

33.   As per claim 13, Subramanian teaches the invention as claimed, including the system of

claim 12 wherein the plurality of computation units further comprise a matrix of the adaptable

computing engine (paragraph 0050).

34.   **Claims 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over**

Wuytack in view of Subramanian in view of Crawford.

35.   As per claim 23, Wuytack teaches the invention as claimed, including a method for

determining an optimal schedule for a plurality of computation units in an adaptable computing

engine, the method comprising:

        determining a value representative of a cost for a chosen schedule to perform a code

segment (col. 7 lines 36-51);

        adjusting the chosen schedule through small incremental steps until the value reaches an

acceptable cost level (col. 16 line 36 - col. 17 line 8); and

designating a feasible schedule once the acceptable cost level is reached (col. 16 line 36 - col. 17 line 8).

36.   Subramanian teaches the invention as claimed, including providing the plurality of computation units as a matrix in the adaptable computing engine (paragraph 0050).

37.   Crawford teaches the invention as claimed, including adjusting the schedule randomly (col. 7 lines 30-41).

38.   It would have been obvious to one of ordinary skill in the art to combine Wuytack, Subramanian, and Crawford since the representing of computation units in a matrix allows for simple calculations. Standard algorithms for calculating values based on matrix algebra are well known and are easily adaptable to interchanging components. A matrix representation provides a great improvement to the calculating capabilities of the system as well as allowing easy reconfiguration. Additionally, Wuytack considers every possible move before deciding which is best suited for effecting the greatest overall improvement upon the schedule. This may lead to a great deal of overhead in processing the cost for each possible move, resulting in an even greater delay. Crawford improves upon this by identifying the most likely causes for delay in the schedule. Once these have been identified, nodes are selected at random and the most promising modification is used. This reduces the number of calculations required without sacrificing the possible improvement to the schedule.

39.   As per claim 24, Wuytack teaches the invention as claimed, including the method of claim 23 wherein the acceptable cost level further comprises a cost of zero (col. 16 line 36 - col. 17 line 8).

40.   As per claim 25, Wuytack teaches the invention as claimed, including the method of

claim 23 further comprising representing the code segment as a dataflow graph of nodes and

edges (col. 7 lines 26-35).

41.   As per claim 26, Crawford teaches the invention as claimed, including the method of

claim 25 wherein the step of adjusting further comprises selecting a node of the dataflow graph

at random and selecting an available change for the node at random to adjust the chosen schedule

(col. 7 lines 30-41).

Conclusion

42.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Syed J Ali whose telephone number is (571) 272-3769. The

examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Meng-Ai T An can be reached on (571) 272-3756. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Syed Ali
October 22, 2004

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